



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

MEMOIRS
OF THE
AMERICAN ACADEMY.

I.

Astronomical, Magnetical, and Meteorological Observations, made at Panama, New Grenada.

By W. H. EMORY,

BREVET MAJOR CORPS TOPOGRAPHICAL ENGINEERS, CHIEF ASTRONOMER AND SURVEYOR OF THE MEXICAN BOUNDARY COMMISSION.

(Communicated by W. C. Bond, Director of Harvard Observatory, Aug. 8th, 1849.)

THE subjoined extracts from a letter addressed to Mr. Bond by Major Emory sufficiently describe the instruments used in making the following observations, as well as the mode of conducting them. The letter is dated Panama, May 8th, 1849.

“Being detained here in our progress to San Diego with some of the instruments intended for the survey of the boundary between the United States and Mexico, I have occupied myself and assistants with making a short series of observations for latitude, longitude, magnetic dip, declination, and intensity; and with a series of meteorological observations with the barometer, maximum and minimum thermometers, Daniell’s hygrometer and the wet-bulb thermometer, and with a few observations for solar radiation with the black-bulb thermometer.

“The observations for latitude were made with a zenith telescope, with a focal length of forty-two inches. The results are not as good as those obtained by me on the Northeastern Boundary with the same instrument, owing to a slight derangement in its parts from long service. The results may no doubt be improved by a more accurate determination of the declinations of the stars used.

“The computations were made by myself and Professor James Nooney, one of my assistants.

“The observations for longitude were made by myself and Lieutenant A. W. Whipple, and those for magnetic dip, declination, and intensity, by Lieutenant A. W. Whipple and myself, but chiefly by the former.

“The results are as follows:—

Latitude, $8^{\circ} 57' 12''.15$ north.

Longitude, $5^{\text{h}} 17^{\text{m}} 57^{\text{s}}.63$ west of Greenwich.

Magnetic declination, $6^{\circ} 54' 37''$ east.

“ dip, $32^{\circ} 00' 00''$.

“ intensity,* 0.87507 (uncorrected for difference of temperature).

“The place of observation was the northwest bastion of the fortification surrounding the city of Panama, and is north of the Cathedral $2''.75$, and west of it $6''.85$ (in arc).

“The results for latitude and longitude above given agree closely with those given by Bauza. His place of observation was the Cathedral.

“The results obtained by Espinar differ widely in longitude. The precise place where he observed cannot be ascertained.

“I have not been able to obtain the determination of latitude and longitude made by Sir Edward Belcher, nor have I ascertained the spot where his observations were made.

“I send you also my determination of the longitude of Chagres, as obtained by the transportation of chronometers from New York. The time at Chagres was determined by observations on east and west stars with a Gambey sextant.”

Observations with Zenith Telescope, by Major W. H. Emory, for Latitude. Panama, New Grenada.

Date, 1849.	No. of Star, B. A. C.	North or South of Zenith.	Micrometers.		North Polar Distance.	Levels.			
			No. 1.	No. 2.		Direct.		Reverse.	
						North.	South.	North.	South.
April 10	3033	N.	1776		$56^{\circ} 30' 48''.24$	35	34	35	29.5
“	3065	S.	1911		$105^{\circ} 33' 58''.76$	35	29.5	33.5	31.5
“	3160	S.	1675		$95^{\circ} 43' 51''.28$	31	34.5	32.5	32.5
“	3246	N.	1712		$66^{\circ} 22' 16''.18$	37	30	42	24
“	3409	N.	1061		$59^{\circ} 38' 10''.90$	35	32	34	33
“	3428	S.	132		$102^{\circ} 34' 30''.29$	34	33	35	31.5
“	3508	N.	693		$65^{\circ} 50' 03''.16$	36	32	45	22
“	3563	S.	348		$96^{\circ} 18' 15''.83$	36	31	32	35
“	3625	N.	1873		$52^{\circ} 53' 31''.48$	34.5	32	49	18
“	3733	S.	845		$109^{\circ} 19' 50''.01$	45	22	26	41
“	3964	N.	998		$67^{\circ} 48' 32''.28$	37.5	31	58.5	10
“	4030	S.	970		$94^{\circ} 17' 48''.07$	55	13.5	25	43

* Intensity at Falmouth, England, taken at unity.

Date, 1849.	No. of Star, B. A. C.	North or South of Zenith.	Micrometers.		North Polar Distance.	Levels.			
			No. 1.	No. 2.		Direct.		Reverse.	
						North.	South.	North.	South.
April 10	4294	S.	1602		95 28 37.34	34	36	11	58
"	4388	N.	1327		66 34 21.09	17.5	54	21	50
April 11	3160	S.	727		95 43 51.28	26	38.5	44	21.5
"	3246	N.	777		66 22 16.10	46	20.5	37.5	30
"	3331	N.	1020		65 32 06.61	35	31	25	42
"	3363	S.	12		96 40 54.92	25	42	30	37.5
"	3508	N.	893		65 50 03.05	38	30	31	37
"	3563	S.	525		96 18 15.83	30	39	35	33.5
"	3625	N.	1334		52 53 31.34	32	36.5	43	26
"	3733	S.	293		109 19 50.10	40	29.5	28.5	41
"	3964	N.	660		67 48 32.16	38	31	50	20
"	4030	S.	593		94 17 48.07	46	24	29	41
"	4294	S.	848		95 28 37.34	35.5	35.5	46	25
"	4388	N.	459.5		66 34 20.94	45	26	46	24
April 12	3160	S.	577		95 43 51.28	25	41	20	47
"	3246	N.	679		66 22 16.02	21	47	38	30
"	3409	N.	1075		59 38 10.70	43	28	36	31
"	3428	S.	170		102 34 30.34	36	31	40	28
"	3508	N.	1081		65 50 02.95	39	30	50	20
"	3563	S.	755		96 18 15.84	48	21	34	35
"	3625	N.	1779		52 53 31.19	36	34	50	20
"	3733	S.	764		109 19 50.17	50	20	29	42
April 24	4294	S.	272		95 28 37.39	27	43	18	52
"	4388	N.		26	66 34 18.94	22	48	38	22
April 25	3033	N.	359		56 30 47.24	30	31	31.5	29
"	3065	S.	491		105 33 58.72	31.5	29	25	36
"	3160	S.	151		95 43 51.06	15	48	25	38
"	3246	N.	262		66 22 14.03	27	36	24	39
"	4516	S.		364	95 28 35.29	38	32	22	48
"	4566	N.	607		66 44 13.21	32	39	51	20
"	4294	S.	506		95 28 37.39	29	41	15	56
"	4388	N.	209		66 34 18.79	19	51	41.5	29
"	3508	N.	571		65 50 01.64	36	29	29	36
"	3563	S.	198		96 18 15.81	22	44	30	36
"	3625	N.	828		52 53 29.34	36	30	30	36
"	3733	S.		243	109 19 50.92	23	44	30	38
"	4127	N.		435	65 12 58.30	38	32	26	44
"	4269	S.	1187		96 40 15.54	26	44	22	49
"	3964	N.	331.5		67 48 30.38	38	31	30	39
"	4030	S.	190.5		94 17 48.08	22	48	29	40.5

*Results of the foregoing Observations for the Latitude of Panama, Northwest Bastion,
by Major W. H. Emory.*

Date, 1849.	I. 3033 3065	II. 3160 3246	III. 3331 3363	IV. 3409 3428	V. 3508 3563	VI. 3625 3733	VII. 3964 4030	VIII. 4127 4269	IX. 4294 4388	X. 4516 4566	Mean of each Night's Observations.
April 10	08".25	08".10		10".62	13".10	18".14	08".79		10".23		8° 57' 11".03
" 11		14.48	10".79		12.79	16.20	12.58		13.02		8 57 13.31
" 12		09.56		11.98	14.73	16.49					8 57 13.19
" 24									14.85		8 57 14.85
" 25	06.08	11.25			11.02	17.14	16.27	07".50	13.15	15".75	8 57 12.27
Means by each pair,	07.17	10.85	10.79	11.30	12.91	16.99	12.55	07.50	12.80	15.75	8 57 11.86

Mean of all the observations, giving the same weight to each, 8° 57' 12".42.

The means of each night's observations agree with each other much closer than the means of the observations of each pair, which shows that the errors in the declinations of the stars used are greater than the errors of observation.

The probable error in the mean of a single pair is $\pm 1''.994$, and the probable error in the mean of all the pairs is $\pm 0''.630$.

Giving to each pair a weight depending on the number of observations on the pair, we have for the most probable determination of the latitude, 8° 57' 12".15.

*Longitude of Panama, New Grenada, Station, Northwest Bastion of the City Wall,
by Major W. H. Emory.*

Date, 1849.	Phenomena observed.	Instruments used		Results obtained for Longitude.	Remarks.
		for observing the Phenomena.	for obtaining the Time at Station.		
March 27	Emersion of Jupiter's 1st satellite observed with sidereal-time chronometer No. 420, by P. and F.	Telescope, by Mertz and Son, Munich, of 56 inches focal length.	Observations on east and west stars with sextant No. 1000, by T. and S.	h. m. s. 5 18 05.70	(E.) Observation satisfactory and time well determined.
April 14	Emersion of Jupiter's 2d satellite observed with mean-solar-time chronometer No. 1481.	" "	" "	5 18 07.26	(E.) Observation satisfactory and time well determined.
April 26	Emersion of Jupiter's 1st satellite observed with sidereal-time chronometer No. 420, by P. and F.	" "	" "	5 17 45.20	(W.) Observation satisfactory and time well determined.
April 30	Culmination of moon's 1st limb.	Portable transit by Troughton & Simms of London. Length of telescope, 23 inches. Aperture of object-glass, 1½ in.	Portable 23-inch transit-instrument, previously described.	5 17 42.04	(W.) These observations are the less satisfactory from the impossibility of keeping the instrument up except while observing. No meridian-mark could be established, and the deviation was usually large. But high and low stars were observed for deviation, and stars near the moon for time.
May 2	" "	" "	" "	5 18 17.47	
May 4	" "	" "	" "	5 17 48.12	

Result from a mean of six observations for the longitude of the northwest bastion of the city wall, 5^h. 17^m. 57^s.63 = 79° 29' 24".45.

Observation for the Magnetic Inclination.

Needle A. — *Station*, Chagres, near the centre of the plateau, east from the village, and 94 feet east from a ruin consisting of two rows of brick pillars, five pillars in each row, and about ten feet in height. *Instrument*, "Fox magnetic circle, made by W. George, of Falmouth; the property of the United States." *Observer*, A. W. Whipple. *Latitude*, $9^{\circ} 20'$ north. *Longitude*, $80^{\circ} 01' 21''$ west of Greenwich, = $5^{\text{h.}} 20^{\text{m.}} 05^{\text{s.}} 41$. *Face of instrument, north*, needle perpendicular, reading of azimuth circle, $23^{\circ}.51$. *Face of instrument, south*, needle perpendicular, reading of azimuth circle $23^{\circ}.51$. *Reading of azimuth circle*, when the vertical circle was in the magnetic meridian, $23^{\circ}.51$. *Date*, March 13th, 1849. *Weather*, clear.

Face of Circle.	Time of Local Observation.	Thermometer.	Change of Brackets.	End of Needle.	Reading of Needle A for Dip.	Remarks.
East.	$5^{\text{h.}} 30^{\text{m.}}$	79°	1st.	below	$31^{\circ} 55'$	Mean inclination east, $31^{\circ} 52'.8$.
				above	$31^{\circ} 50'$	
			2d.	below	$31^{\circ} 55'$	
				above	$31^{\circ} 50'$	
			3d.	below	$31^{\circ} 57'$	
West.	$5^{\text{h.}} 55^{\text{m.}}$			above	$31^{\circ} 50'$	
			1st.	below	$31^{\circ} 60'$	Mean inclination west, $31^{\circ} 56'.3$.
				above	$31^{\circ} 60'$	
			2d.	below	$31^{\circ} 58'$	
				above	$31^{\circ} 55'$	
			3d.	below	$31^{\circ} 55'$	
				above	$31^{\circ} 50'$	

Mean result for magnetic inclination of needle A, $31^{\circ} 54'.5$.

Needle B. — *Station*, Chagres, near the centre of the plateau. *Instrument*, Fox magnetic circle, made by W. George, and the property of the United States. *Observer*, A. W. Whipple. *Latitude*, $9^{\circ} 20'$ north. *Longitude*, $80^{\circ} 01' 21''$ = $5^{\text{h.}} 20^{\text{m.}} 05^{\text{s.}} 41$. *Face of instrument, north*, needle perpendicular, reading of azimuth circle, $24^{\circ} 51'$. *Face of instrument, south*, needle perpendicular, reading of azimuth circle, $25^{\circ} 05'$. *Reading of azimuth circle*, when the vertical circle was in the magnetic meridian, $24^{\circ} 58'$. *Date*, March 14th, 1849. *Weather*, clear.

Face of Circle.	Mean Time of Observation.	Thermometer.	Change of Brackets.	End of Needle.	Reading of Needle B for Dip.	Remarks.
West.	$9^{\text{h.}} 15^{\text{m.}}$	89°	1st.	below	$31^{\circ} 58'$	At sunrise, therm. 80° and bar. 29.86 in.; at $8^{\text{h.}} 30^{\text{m.}}$ A. M., therm. 82° and bar. 29.86 in.; at noon, therm. 83° and bar. 29.83 in.
				above	$31^{\circ} 58'$	
			2d.	below	$31^{\circ} 60'$	
				above	$31^{\circ} 60'$	
			3d.	below	$31^{\circ} 65'$	
East.	$9^{\text{h.}} 30^{\text{m.}}$	94°		above	$31^{\circ} 65'$	Mean inclination west, $32^{\circ} 01'$.
			1st.	below	$31^{\circ} 62'$	
				above	$31^{\circ} 65'$	
			2d.	below	$31^{\circ} 60'$	
				above	$31^{\circ} 65'$	
			3d.	below	$31^{\circ} 58'$	Mean inclination east, $32^{\circ} 02'$.
				above	$31^{\circ} 62'$	

Mean result for magnetic inclination of needle B, $32^{\circ} 01'.5$.

Observation for Total Magnetic Intensity.

Needle B. — Station, Chagres. Latitude, $9^{\circ} 20'$ north. Longitude, $80^{\circ} 01' 21''$ west of Greenwich, = $5^{\text{h}} 20^{\text{m}} 05^{\text{s}}.41$. Date, March 14th, 1849. Observer, A. W. Whipple. Weather, clear. Face of instrument, east. Hour of commencing observations, $9^{\text{h}} 50^{\text{m}}$. Hour of ending observations, $11^{\text{h}} 50^{\text{m}}$.

Deflection with Weight 2 grs.			Deflection with Weight 5 grs.			Deflection with Weight 2 grs. + 1 gr.		
(1.) Deflection from the Vertical and past the Horizontal.	(2.) Deflection toward the Vertical.	Ther- mome- ter.	(1.) Deflection from the Vertical.	(2.) Deflection toward the Vertical.	Ther- mome- ter.	(1.) Deflection from the Vertical and past the Horizontal.	(2.) Deflection toward and past the Vertical.	Ther- mom- eter.
<i>b.</i> 4 18 <i>a.</i> 4 18 <i>b.</i> 4 15 <i>a.</i> 4 18 <i>b.</i> 4 15 <i>a.</i> 4 15	<i>b.</i> 68 05 <i>a.</i> 68 02 <i>b.</i> 67 58 <i>a.</i> 68 00 <i>b.</i> 68 05 <i>a.</i> 68 00	95	<i>b.</i> 23 28 <i>a.</i> 23 28 <i>b.</i> 23 28 <i>a.</i> 23 30 <i>b.</i> 23 28 <i>b.</i> 23 28	<i>b.</i> 40 20 <i>a.</i> 40 23 <i>b.</i> 40 25 <i>a.</i> 40 28 <i>b.</i> 40 20 <i>a.</i> 40 22	92 90	<i>b.</i> 30 12 <i>a.</i> 30 15 <i>b.</i> 30 15 <i>a.</i> 30 18 <i>b.</i> 30 15 <i>a.</i> 30 20	<i>b.</i> 93 58 <i>a.</i> 94 00 <i>b.</i> 93 50 <i>a.</i> 93 55 <i>b.</i> 94 00 <i>a.</i> 94 02	91
Mean 4 16.5	Mean 68 01.7		Mean 23 28.3	Mean 40 23		Mean 30 15.8	Mean 93 57.5	
Half the difference between (1) and (2) = angle of deflec- tion, =				8 27.35			62 06.65	
Half the sum = an- gles of magnetic incli- nation, =				31 55.6			31 50.85	

Instrument, Fox magnetic circle. *Stand*, strong wooden tripod, free from iron. *Magnetic Meridian*, Azimuth, face north, $24^{\circ} 51'$; face south, $25^{\circ} 05'$; mean, $24^{\circ} 58'$. Face of instrument, west. Hour of commencing observations, $9^{\text{h}} 50^{\text{m}}$. Hour of ending observations, $11^{\text{h}} 50^{\text{m}}$.

Deflection with Weight 2 grs.			Deflection with Weight 5 grs.			Deflection with Weight 2 grs. + 1 gr.		
Deflection from the Vertical and past the Horizontal.	Deflection toward the Vertical.	Ther- mom- eter.	Deflection from the Vertical.	Deflection toward the Vertical.	Ther- mom- eter.	Deflection from the Vertical and past the Horizontal.	Deflection toward and past the Vertical.	Ther- mom- eter.
	$b. 68^{\circ} 07'$ $a. 68 07$ $b. 68 05$ $a. 68 05$ $b. 68 05$ $a. 68 05$	91					$b. 93^{\circ} 55'$ $a. 93 55$ $b. 94 00$ $a. 94 00$ $b. 93 52$ $a. 93 52$	90
	Mean 68 05.7						Mean 93 55.7	

Observations for Magnetic Inclination.

Needle A. — Station, Gorgona, Isthmus of Darien. *Instrument*, Fox magnetic circle, made by W. George. *Observer*, A. W. Whipple. *Face of instrument, north*, needle perpendicular, reading of azimuth circle, $4^{\circ} 20'$. *Face of instrument, south*, needle perpendicular, reading of azimuth circle, $4^{\circ} 30'$. *Reading of azimuth circle*, when the vertical circle was in the magnetic meridian, $4^{\circ} 25'$. *Date*, March 17th, 1849. *Weather*, clear. *Mean time of commencing observations*, $10^{\text{h}} 40^{\text{m}}$. A. M.; att. Therm. Fahr. $92^{\circ}.5$. *Mean time of ending observations*, 11^{h} . A. M.; att. Therm. Fahr. 94° .

Face of Circle.	Change of Brackets.	End of Needle.	Reading of Needle A.	Remarks.
East.	1st.	above	$31^{\circ} 30'$	$31^{\circ} 25' 10''$
		below	$31 28$	
	2d.	above	$31 20$	
		below	$31 17$	
	3d.	above	$31 28$	
		below	$31 28$	
West.	1st.	above	$31^{\circ} 12'$	$31^{\circ} 07' 20''$
		below	$31 12$	
	2d.	above	$31 05$	
		below	$31 05$	
	3d.	above	$31 08$	
		below	$31 07$	

Magnetic inclination by needle A, $31^{\circ} 16' 15''$.

Observation for Total Magnetic Intensity.

Needle A. — Station, Gorgona. *Date*, March 17th, 1849. *Observer*, A. W. Whipple. *Weather*, clear. *Face of instrument*, east. *Hour of commencing observations*, $11^{\text{h}}.15$. *Hour of ending observations*, $11^{\text{h}}.35$.

Deflection with Weight 2 grs.			Deflection with Weight 2 grs. + 5 grs.			Deflection with Weight 2 grs. + 1 gr.		
Deflection from the Vertical and past the Horizontal.	Deflection toward the Vertical.	Thermometer.	Deflection from the Vertical.	Deflection toward and past the Vertical.	Thermometer.	Deflection from the Vertical.	Deflection toward and past the Vertical.	Thermometer.
$4^{\circ} 20'$	$67^{\circ} 45'$	93						
$4 20$	$67 45$							
$4 18$	$67 47$							
$4 22$	$67 45$							
$4 15$	$67 45$							
$4 20$	$67 47$							
Mean $4 19.1$	Mean $67 45.6$							
Angle of deflection,	$36^{\circ} 02' 20''$							
Angle of magnetic inclination,	$31 43.2$							

Observations for Total Magnetic Intensity.

Instrument, Fox magnetic circle, made by W. George. *Stand*, strong wooden tripod, free from iron. *Magnetic Meridian*, on limb north, $4^{\circ} 20'$; south, $4^{\circ} 30'$; mean, $4^{\circ} 25'$. *Face of instrument*, west. *Hour of commencing observations*, 11^h.15. *Hour of ending observations*, 11^h.35.

Deflection with Weight 2 grs.			Deflection with Weight 2 grs. + 5 grs.			Deflection with Weight 2 grs. + 1 gr.		
Deflection from the Vertical and past the Horizontal.	Deflection toward the Vertical.	Thermometer.	Deflection from the Vertical.	Deflection toward and past the Vertical.	Thermometer.	Deflection from the Vertical.	Deflection toward and past the Vertical.	Thermometer.
4 45	67 30	93 94						
4 43	67 30							
4 45	67 45							
4 42	67 45							
4 45	67 32							
4 45	67 32							
Mean 4 44	Mean 67 35							
Angle of deflection,	36° 09' 30"							
	31° 25'.5							

Observations for Magnetic Inclination.

Needle A. — *Station*, Panama, under a shed, upon the glacis just beyond the ditch, about 300 feet outside the western gate of the city. *Instrument*, Fox magnetic circle, made by W. George. *Observer*, A. W. Whipple. *Latitude*, North, $8^{\circ} 57' 12''$. *Longitude*, $79^{\circ} 29' 24''.5$ west of Greenwich. *Face of Instrument*, north, needle perpendicular, reading of azimuth circle, $15^{\circ} 18'$. *Face of Instrument*, south, needle perpendicular, reading of azimuth circle, $15^{\circ} 12'$. *Reading of azimuth circle*, when the vertical circle was in the magnetic meridian, $15^{\circ} 15'$. *Date*, March 21st, 1849. *Weather*, clear.

Face of Circle.	Mean Time of Observation.	Thermometer.	Change of Brackets.	End of Needle.	Reading of Needle A.	Remarks.
East.	1 ^h . 20 ^m . P.M.	90	1st.	below	31 35	
				above	31 35	
			2d.	below	31 40	
				above	31 45	
			3d.	below	31 45	
				above	31 45	
Mean Reading East,					31 40.8	
West.	1 ^h . 35 ^m . P. M.	88½	1st.	below	31 32	
				above	31 35	
			2d.	below	31 37	
				above	31 40	
			3d.	below	31 35	
				above	31 35	
Mean Reading West,					31 35.7	

Magnetic inclination of needle A, $31^{\circ} 38'.2$.

Observations for Magnetic Inclination and Intensity.

Needle B. — Station, Panama. Instrument, Fox magnetic circle, made by W. George. Observer, Major Emory. Latitude, $8^{\circ} 57' 12''$ north. Longitude, $79^{\circ} 29' 24''.5$ west of Greenwich, $= 5^h 17^m 57^s.63$. Date, March 26th, 1849. Weather, clear. Mean time of commencing observations, 1^h P. M. Mean time of ending observations, 2^h P. M. Thermometer, 86° .

Face of Circle.	Direct.	Deflection North from App. Dip.		Deflection South from App. Dip.		Results.		
		40° below.	40° above.	40° below.	40° above.			
East, {	$31^{\circ} 45'$	$8^{\circ} 40'$	$54^{\circ} 40'$	$7^{\circ} 10'$	$55^{\circ} 45'$	N. S.	$31^{\circ} 46'$	Direct. By Deflectors.
	$31 30$	$8 35$	$54 30$	$7 20$	$55 45$		$31 34.5$	
	$31 30$	$8 35$	$54 30$	$7 20$	$55 40$		$31 37.3$	
West, {	$32 00$	$8 20$	$54 45$	$7 00$	$56 30$	N. S.		Sum.
	$32 00$	$8 20$	$54 50$	$7 02$	$56 35$			
	$31 52$	$8 20$	$54 50$	$7 05$	$56 15$			
Sums,	$190 37$	$50 50$	$328 05$	$42 57$	$336 30$		$94 57.8$	
Means,	$31 46$	$8 28.3$	$54 40.8$	$7 09.5$	$56 05$		$31 39.26$	Mean.

Needle B. — Station, Panama. Instrument, Fox magnetic circle, made by W. George. Observer, Major Emory. Latitude, $8^{\circ} 57' 12''$ north. Longitude, $79^{\circ} 29' 24''.5$ west of Greenwich, $= 5^h 17^m 57^s.63$. Date, March 26th, 1849. Weather, clear.

Face of Circle.	Thermometer.	Deflection North at App. Dip.		Deflection South at App. Dip.		Results for Magnetic Inclination.		
		(1.) Deflection toward the Vertical.	(2.) Deflection from the Vertical and past the Horizontal.	(1.) Deflection toward the Vertical.	(2.) Deflection toward the Vertical and past the Horizontal.			
East, {	86	$72^{\circ} 45'$	$9^{\circ} 16'$	$74^{\circ} 05'$	$10^{\circ} 05'$	N. S.	$31^{\circ} 42.2^*$ $32 34^{\dagger}$	By Deflectors.
		$72 50$	$9 15$	$74 07$	$10 00$			
		$72 48$	$9 16$	$74 15$	$10 02$			
West, {		$72 50$	$9 35$	$74 30$	$9 50$	N. S.	$31 42.2^*$ $32 34^{\dagger}$	By Deflectors.
		$72 45$	$9 30$	$74 31$	$9 55$			
		$72 50$	$9 30$	$74 32$	$9 50$			
Sums,		$436 48$	$56 22$	$446 00$	$59 42$		$64 16.2$	
Means,		$72 48$	$9 23.6$	$74 20$	$9 12$		$32 08.1$	

* Used with mean.

† Not used in mean; probably error in observation.

Observations for Magnetic Inclination and Intensity.

Needle A. — Station, Panama. *Instrument*, Fox magnetic circle, made by W. George. *Observer*, A. W. Whipple. *Latitude*, $8^{\circ} 57' 12''$. *Longitude*, $79^{\circ} 29' 24''.5 = 5^{\text{h}} 17^{\text{m}} 57^{\text{s}}.63$. *Date*, March 28th, 1849. *Weather*, clear. *Time of commencing observations*, $1^{\text{h}} 27^{\text{m}}$.

Face of Circle.	Deflection North 40° from App. Dip.		Deflection South 40° from App. Dip.		Thermometer.	Results.		
	Deflection toward the Vertical.	Deflection from the Vertical.	Deflection toward the Vertical.	Deflection from the Vertical.				
East, {	$54^{\circ} 32'$	$8^{\circ} 50'$	$56^{\circ} 35'$	$7^{\circ} 10'$	86°			
	$54 35$	$8 55$	$56 35$	$7 10$				
	$54 40$	$8 55$	$56 35$	$7 07$				
West, {	$54 30$	$8 55$	$56 25$	$6 58$	86	N. S.	$31^{\circ} 44.6'$ $31 46.5$	} By Deflectors.
	$54 37$	$8 58$	$56 28$	$6 58$				
	$54 30$	$8 58$	$56 28$	$6 50$				
Sums,	$327 24$	$53 31$	$339 06$	$42 13$			$63 31.1$	
Means,	$54 34$	$8 55.2$	$56 31$	$7 02.1$			$31 45.5$	

Observations for Magnetic Inclination.

Needle A. — Station, Panama. *Instrument*, Fox magnetic circle, made by W. George. *Observer*, A. W. Whipple. *Latitude*, $8^{\circ} 57' 12''$ north. *Longitude*, $79^{\circ} 29' 24''.5$ west of Greenwich, $= 5^{\text{h}} 17^{\text{m}} 57^{\text{s}}.63$. *Face of instrument, north*, needle perpendicular, reading of azimuth circle, $49^{\circ} 15'.5$. *Face of Instrument, south*, needle perpendicular, reading of azimuth circle, $49^{\circ} 16'$. *Reading of azimuth circle*, when the vertical circle was in the magnetic meridian, $49^{\circ} 15'.43$. *Date*, March 28th, 1849. *Weather*, clear.

Face of Circle.	Mean Time of Ob- servation.	Thermometer.	Change of Brackets.	End of Needle.	Reading of Needle A for Dip.	Remarks.
East.	12 ^h .10	87 ^o	1st.	above	31 ^o 37'	
				below	31 40	
			2d.	above	31 45	
				below	31 45	
			3d.	above	31 45	
				below	31 40	
Mean Reading East,					31 42.1	
West.	12 ^h .15	87 ^o	1st.	above	31 ^o 32'	
				below	31 35	
			2d.	above	31 30	
				below	31 30	
			3d.	above	31 37	
				below	31 35	
Mean Reading West,					31 33.1	

Magnetic inclination by needle A, $31^{\circ} 37'.5$.

Observations for Total Magnetic Intensity.

Needle A. — Station, Panama. Latitude, 8° 57' 12". Longitude, 79° 29' 24".5 = 5^h. 17^m. 57^s.63. Date, March 28th, 1849. Observer, A. W. Whipple. Weather, clear. Face of instrument, east. Hour of commencing observations, 2^h. 30^m. Hour of ending observations, 3^h. 30^m.

Deflection with Weight 2 grs.				Deflection with Weight 2 grs. + 5 grs.			Deflection with Weight 2 grs. + 1 gr.		
Deflection from the Vertical and past the Horizontal.	End of Needle.	Deflection toward the Vertical.	Thermometer.	Deflection from the Vertical.	Deflection toward and past the Vertical.	Thermometer.	Deflection from and past the Horizontal.	Deflection toward and past the Vertical.	Thermometer.
4 15	n.	68 15	83.5				29 25	93 20	86
4 15	s.	68 17					29 30	93 20	
4 02	n.	68 20					29 40	93 20	
4 05	s.	68 00					29 28	93 20	
4 18	n.	68 45					29 30	93 25	
4 20	s.	68 30					29 15	93 25	
Mean 4 12.3		Mean 68 21.1					Mean 29 28	Mean 93 21.6	
Angle of deflection,		36 16.7					Angle of deflection,	61 24.80	

Instrument, Fox magnetic circle, made by W. George. Stand, strong wooden tripod, free from iron. Magnetic meridian, on limb north, 49° 15'.5; south, 49° 16'; mean, 49° 15'.43. Face of instrument, west. Hour of commencing observations, 2^h. 30^m. Hour of ending observations, 3^h. 30^m.

Deflection with Weight 2 grs.			Deflection with Weight 2 grs. + 5 grs.			Deflection with Weight 2 grs. + 1 gr.		
Deflection from the Vertical and past the Horizontal.	Deflection toward the Vertical.	Thermometer.	Deflection from the Vertical.	Deflection toward and past the Vertical.	Thermometer.	Deflection from and past the Horizontal.	Deflection toward and past the Vertical.	Thermometer.
4 33	67 50					30 18	92 30	86
4 35	67 45					30 35	92 32	
4 45	67 45					30 00	92 30	
4 46	67 40					30 45	92 32	
4 35	67 50					30 35	92 45	
4 33	67 52					30 25	92 47	
Mean 4 37.5	Mean 67 47					Mean 30 36.3	Mean 92 36	
Angle of deflection,	36 12.25					Angle of deflection,	61 36.15	

Observations for Magnetic Inclination.

Needle C. — Station, Panama, Isthmus of Darien, New Grenada. *Instrument*, Fox magnetic circle, made by W. George. *Observer*, A. W. Whipple. *Latitude*, $8^{\circ} 57' 12''$ north. *Longitude*, $79^{\circ} 29' 24''.5$ west of Greenwich = $5^h 17^m 57^s.63$. *Date*, March 28th, 1849. *Weather*, clear.

Poles direct.

Face of Circle East.					Face of Circle West.				
Mean Solar Time of Observation.	Thermometer.	Change of Brackets.	Reading of North End of Needle.	Reading of South End of Needle.	Mean Solar Time of Observation.	Thermometer.	Change of Brackets.	Reading of North End of Needle	Reading of South End of Needle.
5 ^h . 50 ^m .	83	1	31 58	32 05	5 ^h . 50 ^m .	83	1	31 55	31 47
		2	31 45	31 50			2	31 50	31 47
		3	31 55	32 00			3	31 58	31 50
Mean with Poles Direct,									31 52.5

Poles reversed.

Face of Circle East.					Face of Circle West.				
Mean Solar Time of Observation.	Thermometer.	Change of Brackets.	Reading of North End of Needle.	Reading of South End of Needle.	Mean Solar Time of Observation.	Thermometer.	Change of Brackets.	Reading of North End of Needle.	Reading of South End of Needle.
6 ^h . 15 ^m .	81	1	32 05	32 00	6 ^h . 15 ^m .	81	1	32 15	32 15
		2	32 00	32 00			2	32 25	32 28
6 ^h . 24 ^m .		3	32 00	32 00	6 ^h . 24 ^m .		3	30 07	32 07
Mean with Poles Reversed,									32 08

Final result with needle *C*, poles direct and reversed, $32^{\circ} 00'.25$.

Needle B. — Station, Panama, northwest bastion of the city wall. *Instrument*, Fox magnetic circle, made by W. George. *Observer*, A. W. Whipple. *Latitude*, $8^{\circ} 57' 12''$. *Longitude*, $79^{\circ} 29' 24''.5$ = $5^h 17^m 57^s.63$. *Face of Instrument*, north, needle perpendicular, reading of azimuth circle, $11^{\circ} 05'.5$; $11^{\circ} 03'.5$; $11^{\circ} 05'$. *Face of instrument*, south, needle perpendicular, reading of azimuth circle, $11^{\circ} 06'.5$; $11^{\circ} 06'.5$; $11^{\circ} 06'.5$. *Reading of azimuth circle*, when the vertical circle was in the magnetic meridian, $11^{\circ} 05'.5$. *Date*, April 2d, 1849. *Weather*, clear.

Face of Circle.	Mean Time of Observation.	Thermometer.	Change of Brackets.	End of Needle.	Reading of Needle <i>B</i> for Dip.	Remarks.
East.	3 ^h . P. M.	90.5	1	below	31 55	31° 54'
				above	31 52	
			2	below	31 50	
				above	31 57	
			3	below	31 55	
				above	31 55	
West.	5 ^h . 40 ^m .	91	1	below	31 55	31° 54'.3
				above	31 52	
			2	below	31 59	
				above	31 55	
			3	below	31 55	
				above	31 50	

Mean result for dip of needle *B*, $31^{\circ} 54'.2$.

Observations for Total Magnetic Intensity.

Needle B. — *Station*, Panama, northwest bastion of the city wall. *Latitude*, $8^{\circ} 57' 12''$. *Longitude*, $5^{\circ} 17' 57''.63$. *Date*, April 2d, 1849. *Observer*, A. W. Whipple. *Weather*, clear. *Face of instrument*, east. *Hour of commencing observations*, $5^h. 25^m$. *Hour of ending observations*, $6^h. 00^m$.

Deflection with Weight 2 grs.			Deflection with Weight 2 grs. + 0.5 grs.			Deflection with Weight 2 grs. + 1 gr.		
Deflection from the Vertical and past the Horizontal.	Deflection toward the Vertical.	Thermometer.	Deflection from the Vertical and past the Horizontal.	Deflection toward the Vertical.	Thermometer.	Deflection from the Vertical and past the Horizontal.	Deflection toward the Vertical.	Thermometer.
<i>a.</i> $3^{\circ} 58'$	<i>b.</i> $68^{\circ} 07'$		<i>a.</i> $14^{\circ} 58'$	<i>b.</i> $79^{\circ} 58'$	90	<i>a.</i> $29^{\circ} 45'$	<i>b.</i> $93^{\circ} 15'$	84
<i>b.</i> $3^{\circ} 58'$	<i>a.</i> $68^{\circ} 05'$		<i>b.</i> $15^{\circ} 05'$	<i>a.</i> $79^{\circ} 55'$		<i>b.</i> $29^{\circ} 55'$	<i>a.</i> $93^{\circ} 20'$	
<i>a.</i> $4^{\circ} 15'$	<i>b.</i> $68^{\circ} 15'$		<i>a.</i> $15^{\circ} 30'$	<i>b.</i> $79^{\circ} 52'$		<i>a.</i> $29^{\circ} 58'$	<i>b.</i> $93^{\circ} 30'$	
<i>b.</i> $4^{\circ} 00'$	<i>a.</i> $68^{\circ} 15'$		<i>b.</i> $15^{\circ} 22'$	<i>a.</i> $79^{\circ} 50'$		<i>b.</i> $29^{\circ} 57'$	<i>a.</i> $93^{\circ} 15'$	
<i>a.</i> $4^{\circ} 02'$	<i>b.</i> $68^{\circ} 12'$		<i>a.</i> $15^{\circ} 07'$	<i>b.</i> $79^{\circ} 58'$		<i>a.</i> $29^{\circ} 50'$	<i>b.</i> $93^{\circ} 32'$	
<i>b.</i> $4^{\circ} 15'$	<i>a.</i> $68^{\circ} 20'$		<i>b.</i> $15^{\circ} 15'$	<i>a.</i> $79^{\circ} 58'$		<i>b.</i> $29^{\circ} 50'$	<i>a.</i> $93^{\circ} 28'$	
Mean $4^{\circ} 04.6$	Mean $68^{\circ} 12.3$		Mean $15^{\circ} 12.8$	Mean $79^{\circ} 55.1$		Mean $29^{\circ} 52.5$	Mean $93^{\circ} 23.3$	
Angle of deflection,	36 08.5		Angle of deflection,	47 33.95		Angle of deflection,	61 37.9	

Observations for Magnetic Declination.

Station, Panama. *Instrument*, Fox magnetic circle, made by W. George. *Observer*, A. W. Whipple. *Latitude*, $8^{\circ} 57' 12''$ north. *Longitude*, $79^{\circ} 29' 24''.5 = 5^h. 17^m. 57''.63$. *Date*, March 21st, 1849. *Weather*, clear.

Times of Observation.	Mean Time of Passage of Polaris over the Meridian.	Hour Angle in Sidereal Time.	Face of Instrument.	Reading of Circle for observing Azimuth.	Correction for True Azimuth of Polaris.	Reading of Circle when reduced to True Meridian.
h. m.	h. m.	h. m.		$23^{\circ} 54' "$	$1^{\circ} 30' 41''$	$22^{\circ} 23' 19''$
7 17	1 08	6 09	East.	$23^{\circ} 52' 30''$	$1^{\circ} 30' 20''$	$22^{\circ} 22' 10''$
7 27		6 19		$23^{\circ} 52'$	$1^{\circ} 30' 00''$	$22^{\circ} 22' 00''$
7 37		6 29		$23^{\circ} 51' 30''$	$1^{\circ} 29' 30''$	$22^{\circ} 22' 00''$
7 47		6 39		$23^{\circ} 51' 30''$	$1^{\circ} 28' 34''$	$22^{\circ} 22' 56''$
7 57		6 49		$23^{\circ} 50' 30''$	$1^{\circ} 27' 34''$	$22^{\circ} 22' 56''$
8 09		7 01		$23^{\circ} 35' 35''$	$1^{\circ} 14' 30''$	$22^{\circ} 21' 00''$
9 24		8 16				Mean $22^{\circ} 22' 20.1$
8 21		7 13	West.	$23^{\circ} 37' 30''$	$1^{\circ} 25' 53''$	$22^{\circ} 11' 37''$
9 04		7 56		$23^{\circ} 34' 30''$	$1^{\circ} 19' 15''$	$22^{\circ} 15' 15''$
9 13		8 05		$23^{\circ} 34' 30''$	$1^{\circ} 16' 42''$	$22^{\circ} 17' 48''$
9 17		8 09		$23^{\circ} 33' 30''$	$1^{\circ} 15' 34''$	$22^{\circ} 17' 56''$
						Mean $22^{\circ} 15' 39''$

Reading of azimuth circle when reduced to true meridian,	$22^{\circ} 18' 59''$
Reading of azimuth circle when the vertical circle is in the plane of the magnetic meridian,	15 15
Magnetic declination east of north, deduced from observations on Polaris, March 21st,	$7^{\circ} 03' 59''$

Observations for Magnetic Declination.

Station, Panama. Instrument, Fox magnetic circle, made by W. George. Observer, A. W. Whipple. Latitude, 8° 57' 12" north. Longitude, 79° 29' 24".5 = 5^h. 17^m. 57^s.63. Date, March 28th, 1849. Weather, clear.

Time of Observation.	Mean Time of Passage of Polaris over the Meridian.	Hour Angle in Sidereal Time.	Face of Instrument.	Reading of Circle for Observing Azimuth.	Correction for True Azimuth of Polaris.	Reading of Circle when reduced to True Meridian.
h. m.	h. m.	h. m.				
6 21	0 40	5 42	East.	57° 37' 30"	1° 30' 32"	56° 06' 58"
6 45		6 05		57 37 30	1 30 44	56 06 46
						Mean 56 06 52
6 52		6 14		57 32	1 30 30	56 01 30

Reading of azimuth circle when reduced to true meridian, 56° 04' 11"

Reading of azimuth circle when the vertical circle is in the plane of the magnetic meridian, 49 15 45

Magnetic declination east of north, deduced from observations on Polaris, 6 48 26

Station, Panama. Instrument, Fox magnetic circle, made by W. George. Observer, A. W. Whipple. Latitude, 8° 57' 12". Longitude, 79° 29' 24".5 west of Greenwich = 5^h. 17^m. 57^s.63. Date, April 2d, 1849. Weather, clear.

Times of Observation.	Mean Time of Passage of Polaris over the Meridian.	Hour angle in Sidereal Time.	Face of Instrument.	Reading of Circle for observing Azimuth.	Correction for True Azimuth of Polaris.	Reading of Circle when reduced to True Meridian.
h. m.	h. m. s.	h. m. s.				
6 49	0 20 30	6 29 34	East.	19° 31' 00"	1° 29' 59.5"	18° 01' 00.5"
6 50		6 34 30		19 30 30	1 29 40	18 00 50
6 57		6 37 30		19 31 00	1 29 33	18 01 27
6 58		6 38 30		19 30 30	1 29 29	18 00 01
7 00		6 40 00		19 30 00	1 29 21	18 00 39
						Mean 18 00 47
7 06		6 47 30	West.	19 22 00	1 28 46	17 53 14
7 06 30		6 48		19 22 00	1 28 40	17 53 17
7 08		6 49 30		19 22 00	1 28 34	17 53 26
7 10		6 51 30		19 21 45	1 28 22	17 53 23
7 15		6 56 30		19 21 30	1 27 52	17 53 38
7 19		7 00 00		19 21 15	1 27 37	17 53 48
						Mean 17 53 28
7 24		7 05	West.	19 21 00	1 27 01	17 53 59
7 26		7 07		19 21 00	1 26 43	17 54 17
7 28		7 09		19 20 30	1 26 25	17 54 05
7 30		7 11		19 20 30	1 26 07	17 54 23
7 32		7 13		19 20 00	1 25 53	17 54 07
						Mean 17 54 00
7 44		7 25	East.	19 24 30	1 24 30	18 00 00
7 48		7 29		19 24 00	1 23 34	18 00 26
7 50		7 31		19 23 30	1 23 06	18 00 24
7 55		7 36		19 23 30	1 22 51	18 00 39
7 58		7 39		19 22 00	1 21 19	18 00 41
						Mean 18 00 26

Results from the Observations of April 2d.

1st mean,	18° 00' 47"
2d "	18 00 26
Mean reading face east,	18 00 36
" " west,	17 53 49
Reading of azimuth circle when reduced to true meridian,	17 57 12.5
" " " the instrument is in the magnetic meridian,	11 05 36
Magnetic declination deduced from observations on Polaris, April 2d, 1849,	6 51 36.5

Results for Magnetic Declination at Panama.

For March 21st, 1849,	6° 63' 59"
" 28th, "	6 48 26
For April 2d, "	6 51 36
Final result for the declination of the magnetic needle at Panama, April, 1849, east of north,	6 54 37

Computation of the Preceding Observations for the Intensity of the Magnetic Force

$$I' = \frac{I \sin V}{\sin V'}.$$

Mr. Fox observed with this instrument upon needles *A*, *B*, and *C*, at Falmouth, England, September, 1844, and at the temperature of 60° obtained an intensity of 1,000.

Major Graham and Mr. W. C. Bond observed with the same instrument upon needles *A*, *B*, and *C*, and obtained the following results, which are uncorrected for difference of temperature:—

1844, December 30th.	Temperature +39°.5, needle <i>B</i> with weight 3 grs. gave an intensity = 1.2963
" " " " " " 3.5 " "	= 1.2961
" " " <i>A</i> " " 3 " "	= 1.2900
" " " " " " 3.5 " "	= 1.289
" " " " " 2 deflectors " "	= 1.3014

1845, January 2d.	Temperature +36°, needle <i>A</i> with weight 3.5 grs. gave an intensity = 1.2870
" " " <i>C</i> " 2.5 " "	= 1.2940
" " " " " 3 " "	= 1.2986

1845, January 3d.	Temperature +13° to 19°, needle <i>C</i> with weight 2.5 grs. gave an intensity = 1.30106
" " " " 3 " "	= 1.30230
" 26° " " 3.5 " "	= 1.31200

Mr. Bond and Mr. Whipple at the magnetic observatory at Cambridge made observations with the same instrument upon needles *A*, *B*, and *C*, and the following are some of the results obtained : —

1849, February 24th. Temperature 42°, magnetic inclination by needle *B*, 74° 33'.9
 Angle of deflection of needle *B*, with deflector north at apparent dip, 32° 55'.6
 " " " " south " 34° 04

Feb. 24th. Temperature 46°, angle of deflection of needle *B* with weight 2 grs., 23° 32'.25
 " " " " " " " 2 + 1 grs., 36 28.75
 " " " " " " " 2 + 1 + 0.5 grs., 44 05.3
 Feb. 25th. " 36.5, " " " *A* " 2 grs., 23 26.55
 " " " " " " " 2 + 1 grs., 36 25.65
 " " " " " " " 2 + 1 + 0.5 grs., 43 55.25

Plane of instrument in magnetic meridian, magnetic declination 9° 28' west.

$$\text{Formula for Computation, } I' = \frac{I \sin V}{\sin V'}.$$

I = Intensity of magnetism of the needle at Cambridge, Mass.

V = Angle of deflection " " " "

V' = " " " station.

I' = Intensity of magnetic needle at station.

Results for Magnetic Intensity. Obtained by Computation of the Preceding Observations.

Date, 1849.	Station.	Needle used.	Weight deflected by	Angles of Deflection.		Intensity at Cambridge Observatory, Mass.	Intensity at Station.
				<i>V</i> .	<i>V'</i> .		
March 14	Chagres,	<i>B</i> .	2 grains,	23 32 21	36 09 06	1.2962	0.87745
" "	"	"	2 + 1 gr.	36 28 45	62 06 39	1.2962	0.87181
" 17	Gorgona,	<i>A</i> .	2 grains,	23 26 33	36 02 21	1.2900	0.87229
" 28	Panama,	<i>A</i> .	2 grains,	23 26 33	36 16 42	1.2900	0.87141
" "	"	"	2 + 1 gr.	35 45 27	61 24 48	1.2900	0.87648
April 2	"	<i>B</i> .	2 grains,	23 32 21	36 08 30	1.2962	0.87766
" "	"	"	2 + 1 gr.	36 28 45	61 37 54	1.2962	0.87573

Results for intensity at Panama, 0.87507

" " Gorgona, 0.87229

" " Chagres, 0.87493

Results for Magnetic Inclination.

Station.	Date, 1849.	Needle used	Index Cor. for Needle.	Inclination Observed.	True Inclination Deduced.	Weights used.	Deflectors used.	No. of Observ. made.	Mean Result for Magnetic Inclination at Station.
Chagres, Lat. $9^{\circ} 20'$ North. Long. $5^{\text{h}} 20^{\text{m}} 05^{\text{s}}.41$ W.	March 13	A	+18.5	$31^{\circ} 54.5'$	$32^{\circ} 13.0'$			12	$32^{\circ} 11.4'$
	" 14	B	+15.5	$32^{\circ} 01.5'$	$32^{\circ} 17.4'$			12	
	" "	"	"	$31^{\circ} 52.6'$	$32^{\circ} 08.5'$	2 grs.		12	
	" "	"	"	$31^{\circ} 55.6'$	$32^{\circ} 11.5'$	0.5 "		12	
	" "	"	"	$31^{\circ} 50.8'$	$32^{\circ} 06.7'$	3 "		12	
Gorgona,	March 17	A	+18.5	$31^{\circ} 16.2'$	$31^{\circ} 34.7'$			12	$31^{\circ} 46.8'$
	" "	"	"	$31^{\circ} 43.2'$	$31^{\circ} 61.7'$	2 grs. E.		12	
	" "	"	"	$31^{\circ} 25.5'$	$31^{\circ} 44.0'$	2 grs. W.		12	
Panama, Glacis, Lat. $8^{\circ} 57' 12''$ North. Long. $79^{\circ} 29' 24''.5 =$ $5^{\text{h}} 17^{\text{m}} 57^{\text{s}}.63$ W. of G.	March 21	A	+18.5	$31^{\circ} 38.2'$	$31^{\circ} 56.7'$			12	$32^{\circ} 00.0'$
	" "	"	"	$31^{\circ} 49.7'$	$31^{\circ} 68.2'$			12	
	" "	"	"	$31^{\circ} 41.4'$	$31^{\circ} 59.9'$		N. face E.	12	
	" "	"	"	$31^{\circ} 41.4'$	$31^{\circ} 59.9'$		N. face W.	12	
	" 26	B	+15.9	$31^{\circ} 46.0'$	$31^{\circ} 61.9'$			6	
	" "	"	"	$31^{\circ} 34.5'$	$31^{\circ} 50.4'$		N.	6	
	" "	"	"	$31^{\circ} 37.3'$	$31^{\circ} 53.2'$		S.	6	
	" "	"	"	$31^{\circ} 42.2'$	$31^{\circ} 58.1'$		N.	12	
	" 28	A	+18.5	$31^{\circ} 44.6'$	$31^{\circ} 63.1'$		N.	12	
	" "	"	"	$31^{\circ} 46.5'$	$31^{\circ} 65.0'$		S.	12	
	" "	"	"	$31^{\circ} 37.5'$	$31^{\circ} 56.0'$			12	
	" "	"	"	$31^{\circ} 49.5'$	$31^{\circ} 68.0'$	2 grs.	E. and W.	24	
	" "	"	"	$31^{\circ} 28.4'$	$31^{\circ} 46.9'$	3 "	E. and W.	24	
Panama, N.W. bast. of city wall,	April 2	B	+15.9	$31^{\circ} 54.2'$	$31^{\circ} 70.1'$			12	
	" "	"	"	$31^{\circ} 45.4'$	$31^{\circ} 61.3'$	3 "		12	
Panama, Glacis,	March 28	C	0.0	$31^{\circ} 52.5'$	$31^{\circ} 52.50'$	Poles direct.		12	$32^{\circ} 00.25^*$
	" "	"	0.0	$31^{\circ} 60.25'$	$31^{\circ} 68.00'$	" reversed.		12	

* Mean result for magnetic inclination at Panama, with needle C, poles direct and reversed.

Meteorological Observations

Station.	Date, 1849.	Hour.	Barometer. No. 2.	Thermometers.		Clouds.			Winds.	
				Att.	Det.	Name.	Direction.	Amount	Direction.	Force.
Panama.	March 22	9 A. M.	30.014	78	78	Stratus,		9	N.	2
	" "	5½ P. M.	29.919	82.5	81.5			1	N. N. E.	1
	" "	9 "	29.929	78	77.5			0	"	1
	" 23	9 A. M.	30.021	81	80.5			4	"	3
	" "	3 P. M.	29.984	84.5	84	Clear,		3		3
	" "	9 "	30.009	78	77			1		1
	" 24	9 A. M.	30.020	79.5	78.5			7		1
	" "	3 P. M.	29.960	85	84			4		2
	" 25	9 A. M.	30.000	80	79					
	" "	3 P. M.	29.945	85	84		N. E.	5	N. W.	3
	" 26	9 A. M.	30.000	78.5	77.5		N. W.	1	"	1
	" "	3 P. M.	29.940	82.5	81.5			4		1
	" "	9 "	29.956	75	75.5				W.	1
	" 27	9 A. M.	30.000	76	75.5			1	N. W.	1
	" "	3 P. M.	29.958	82.5	82			3		1
	" 28	9 A. M.	30.018	78	77			1		1
	" "	3 P. M.	29.940	83.5	82.5			2		2
	" "	9 "	30.075	75	75.5				N. E.	.5
	" 29	9 A. M.	30.000	80	79			4		1
	" "	3 P. M.	29.970	82.5	81.5			8		1
	" 30	9 A. M.	30.030	80	79			3		2
	" "	3 P. M.	29.970	86	83.5			6		.5
	" "	9 "	30.025	77.5	77.2					.5
	" 31	9 A. M.	30.020	81	80			6		2
	" "	3 P. M.	29.965	86.5	84.5			5		2
	April 1	9 A. M.	30.006	81.5	80	Cirro cumuli, Cumuli,		6		1
	" 2	9 "	30.031	82	82			8	N. E.	2
	" 3	9 "	30.022	78	78			8.5		2
	" "	3 P. M.	29.980	85.5	84.5			5		2.5
	" 4	9 A. M.	30.040	81	80	"		3		1
	" "	3 P. M.	29.965	85	84	"		7		1
	" 5	9 A. M.	29.990	82	81	"		3		.5
	" "	3 P. M.	29.922	86.5	84.5	"		1		2
	" 6	9 A. M.	29.960	82.5	81.5	"		3		.5
	" "	3 P. M.	29.900	86	85			2		1
	" 7	9 A. M.	29.986	82	81.5			5		.5
	" "	3 P. M.	29.927	86	84.5			2		.5
	" 8	9 A. M.	29.960	82	81.5			3		.5
	" 9	9 "	29.960	82	81.5			3		.5
	" "	3 P. M.	29.916	85	84			4		.5
	" 10	9 A. M.	29.960	82	81.5			3		.5
	" "	3 P. M.	29.905	85.5	84.5	Cumuli,		5		.5
	" 11	9 A. M.	29.960	81.5	81.5	"		3		.5
	" "	3 P. M.	29.905	85.5	84			4		1
	" "	9 "	29.970	78.8	78.6					
	" 12	9 A. M.	29.980	82	81.3	Cumuli,		2		.5
	" 13	9 "	29.980	82	81	Cirro,		1	N. E.	3
	" "	3 P. M.	30.000	86	85	Cumuli strata,		5	N. W.	2
	" 14	9 A. M.	30.050	80	78.3			3		2
	" "	3 P. M.	29.980	84.5	83.7					
	" 15	9 A. M.	30.000	77	76.5			1		1
	" "	3 P. M.	29.930	83	82					
	" 16	9 A. M.	30.040	78.5	77.7			.5		.5
	" 17	9 "	30.074	79	78.5			4		1
	" "	3 P. M.	30.001	84.5	83.2			7		2

made at Panama.

Hour.	Thermometers.			Dan. Hygrometer.			Dew-point = Free Therm. — prec. Diff.	Wet Bulb.		Remarks.
	Max.	Min.	Rad.	Before be- ing wet with ether.	After be- ing wet with ether.	Difference = Fall of Therm.		Free.	Wet.	
9 A. M.	85.2	78°						79°	73.5	Barometer sixty-two feet above [medium tide. Syphon barometer, No. 2, by [James Green, of Baltimore.
6 P. M.								81.5	74	
9 “								77.5	72.5	
9 A. M.	85.2	74.5						81.5	73.5	
“	87	72.5						82.5	78.4	
“	86	71.5						79	77	
“	87	71.5						77.1	76	
9 P. M.								75.5	70.5	
9 A. M.	86.5	69.5						75.5	74.5	
“	86	70.5						77	71.5	
“	85.5	70						79	74	
“	85	72.5						79	72	
“	87	74						80	73	
“	87.5	75						80	75	
“	85.2	74.3						82	72	
“	86	73.5						77.5	72	Drizzly rain.
“	86	73.3						80	73	
“	86.3	73						81	74	
“	87.5	74.5						81.5		
“	86.5	74.5						81.5	76	
“	87.5	74.5						81.5	76	
“	87.5	74.8						81.5	76	
“	86.5	75.5						81.5	75	
“	87.5	77.5						81.5	77	
“	88	75						81.5	75.3	
“	87	73.5						81.5	74	
“	87.5	70.5						78.5	72	
“	86	69.5						76.5	70	
“	83.5	70.5						77.7	73.5	
“	85.5	72						78.5	75	

Meteorological Observations

Station.	Date, 1849.	Hour.	Barometer. No. 2.	Thermometers.		Clouds.			Winds.	
				Att.	Det.	Name.	Direction.	Amount.	Direction.	Force.
Panama.	April 18	9 A. M.	30.050	83	81	Cumulo stratus,		6		1
	" "	3 P. M.	29.938	84.8	84		N.	5	N. W.	3
	" "	9 "	29.990	77.8	77.4					
	" 19	9 A. M.	30.014	80.8	79.7		N.	5	N. W.	3
	" "	3 P. M.	30.020	80.2	79.8	Cirro cum. strat.,	N. E.	9	"	2
	" 20	9 A. M.	29.995	80.7	79.4		"	9	"	1
	" "	3 P. M.	29.910	81	80	Cumulo stratus,	"	9.5	"	2
	" "	9 "	29.980	78	77.7		"	1	"	2
	" 21	9 A. M.	30.010	82.7	81.6	Cumuli,	N.	2.5	"	1
	" "	3 P. M.	29.975	85	83.2	Cirro cumuli,	N. N. E.	4	N. N. E.	3
	" 22	9 A. M.	30.030	82.3	81	Cumuli,	N. E.	3.5	N. W.	1
	" "	3 P. M.	29.920	86.3	85.3	"	"	3.5	"	3.5
	" 23	9 A. M.	29.995	83	81.8	Cumulo stratus,	"	8	"	2
	" "	3 P. M.	29.933	86.2	84.8	"	"	5	"	2
	" "	6 "	29.935	81.5	81	Cirrus,	N. W.	3	"	1
	" "	9 "	29.917	79.5	78.8	Clear,			"	2
	" "	12 M.	29.945	77.5	77.8	"			None.	
	" 24	3 A. M.	29.949	77	77			0		0
	" "	6 "	29.936	81	77.8	Cirrus,		.3	W.	1
	" "	9 "	29.986	84.5	82.8	Cumulus,	N.	3	N. W.	2
	" "	12 M.	29.954	86.8	85	"	N. E.	4	"	1
	" "	3 P. M.	29.874	86.8	84.4	Cirro cumulus,	N.	3	"	2.5
	" "	6 "	29.988	83.5	82.3	Cirrus,	N. W.	3	"	2
	" "	9 "	29.907	75.5	78.8	Clear,			"	1.5
	" "	12 M.	29.913	76.5	73.5	"				0
	" 25	6 A. M.	29.920	75.8	75.2	Cumulus cirrus,		3	N. N. W.	1
	" "	9 "	29.972	83.6	81.8	Cirro cumulus,	N. N. E.	4.5	N. W.	2
	" "	12 M.	29.940	86.5	84.8	"	N. W.	5	S. W.	1
	" "	3 P. M.	29.885	85.8	84	"	N.	5	"	2
	" "	6 "	29.880	82.5		Cumulus,		2	S. E.	1
	" "	9 "	29.898	79	78.2	Clear,			S. W.	2.5
	" "	12 M.	29.913	76	76			0	W.	3
	" 26	6 A. M.	29.924	76	75.8	Cirrus,		1	N. W.	1
	" "	9 "	29.944	83.5	81.6	Cirro cumulus,	N. N. E.	2	"	1
	" "	12 M.	29.933	86.8	85	"	N.	3	"	1
	" "	3 P. M.	29.912	85.5	84	"	"	4	"	2
	" "	6 "	29.880	82.5	81.4					
	" "	9 "	29.915	78.5	77.6	Clear,		0	W.	2
	" 27	9 A. M.	29.970	83.8	82	Cirrus,	N.	3	N. W.	1
	" "	12 M.	29.958	85	83.5	Cirro cumulus,	S.	8		1
	" "	3 P. M.	29.909	81	80.6	Cumulus,	E.	6	W.	2
	" "	6 "	29.892	80	79.4	Cumulus stratus,		3	N. W.	1
	" "	9 "	29.943	78	77.5	Stratus,	E.	5	"	1
	" "	12 M.	29.904	76	76	"	"	3	W.	1
	" 28	6 A. M.	29.953	75	74.8	"	N. N. E.	8		.5
	" "	9 "	29.993	81	79.5	Cumulus stratus,	S.	9	W.	1
	" "	12 M.	29.987	84	81.8			9.5		1
	" "	3 P. M.	30.000	85	82.3	Cumulus,	N. W.	9.5	W.	1.5
	" "	6 "	29.900	82.5	81	Cirro cumulus,	"	2	"	.5
	" "	9 "	29.930	78.6	77.7	Clear,		.5	"	1
	" 29	6 A. M.	29.920	76.2	75.6	Cumulus,	N. W.	9.5	N. N. W.	1
	" "	9 "	29.952	79	78	Cirro cumulus,	"	9	W.	1
	" "	12 M.	29.941	83.5	81.5				N. W.	
	" "	3 P. M.	29.891	82.5	81.2	Cirro cumulus,	N.	8.5	"	3
	" "	6 "	29.865	80.8	79.4	Cirro stratus,		3	"	1

made at Panama.

Hour.	Thermometers.			Dan. Hygrometer.			Dew-point = Free Therm. - prec. Diff.	Wet Bulb.		Remarks.
	Max.	Min.	Rad.	Before be- ing wet with ether.	After be- ing wet with ether.	Difference = Fall of Therm.		Free.	Wet.	
9 A. M.	86.3	74.7						81	75.5	
"	86.5	74.5						79.5	76.7	
"	86.4	74.7						79.5	76.7	12 M. hard shower, thunder and [lightning to S. E.]
"	83.1	74.5						80.7	76	
"	86	73.3								Clouds near horizon.
"	88	74.3						81.8	77.5	
3 P. M.			113	86	75	11	74	85	76.8	
6 P. M.								81	75.8	
12 M.								77.8	74.8	
3 A. M.								77	74.5	
6 "			96					79	76	
9 "	87	74.8						82.8	76.5	
12 M.				89	73	16	68.3	84.3	75.8	
3 P. M.			197.5	88.5	72	16.5	67.9	84.4	75.5	
6 "				85.5	74	11.5	70.8	82.3	77.5	
9 "								78.5	74.5	
12 M.								73.5	74	
6 A. M.				87.5	74	13.5	61.9	75.4	73	
9 "	89	74.5	100	96				82	76.4	
12 M.			101	89.5	74.2	15.5	69.5	85	76	
3 P. M.				88.5	73.5	15	69	84	78	
6 "				83.5	73	10.5	71	81.5	75.5	Clouds near horizon.
9 "								78.2	74	
12 M.								76	73	
6 A. M.				76.8	72.5	4.3	71.5	75.8	76	
9 "	88	74.4	103	82.8	74	8.8	72.8	81.6	78	
12 M.				87.5	74	13.5	70.7	84.2	77.5	
3 P. M.				87	76	11	73	84	79	Light shower, 2 P. M.
6 "				83	73	10	71.4	81.4	76.5	
9 "								77.8	74	
9 A. M.	88	75	99	85	75	10	72	82	76.5	
12 M.				88	76.5	11.5	72.1	83.6	77	Rain in the distance.
3 P. M.				84	76	8	72.3	80.3	77	Shower.
6 "				81	73	6	73.4	79.4	76	
9 "								77.5	74.5	
12 M.				77.5	76	1.5	74.5	76	74	
6 A. M.				75.4	72	3.4	71.4	74.8	72	
9 "	86.2	74		82	76.8	5.2	74.6	79.8	76.5	
12 M.				85.5	76	9.5	72.5	82	77	
3 P. M.				85.2	76	9.2	74.2	83	76	Shower in the distance.
6 "				83.3	74	9.3	71.7	81	75	
9 "								77.8	74	
6 A. M.				76.8	72.5	3.3	72.3	75.6	72.5	Slight shower, 7 A. M.
9 "	86.6	74.5		83	77.5	5.5	72.8	78.3	76	
12 M.								81.5		
3 P. M.				84	76	8	73.1	81.1	75	Squall of wind and rain.

Meteorological Observations

Station.	Date, 1849.	Hour.	Barometer. No. 2.	Thermometers.		Clouds.			Winds.	
				Att.	Det.	Name.	Direction.	Amount.	Direction.	Force.
Panama.	April 29	9 P. M.	30.000	78	77.5		N.	4	N. W.	2
	" 30	6 A. M.	29.911	75.8	74.9	Cumulus stratus,	"	3	W.	1
	" "	9 "	29.951	82.5	80.6	Cumulus,	"	8.5	N.	2
	" "	12 M.	29.812	81	79.5	"	"	9.5	N. W.	1.5
	" "	3 P. M.	29.882	80.2	79.4	"	N. W.	9	W.	1
	" "	6 "	29.870	79.5	78.6	Cumulus stratus,	S. W.	7	"	1
	" "	9 "	29.870	78	77	Cumulus,	"	2	"	1.5
	May 1	6 A. M.	29.906	76.8	76	Cumulus stratus,	N. W.	9.5	"	1
	" "	9 "	29.942	81	79.8	Cumulus,	N.	9.5	N. E.	2
	" "	12 M.	29.953	83.2	81.5	"	N. W.	9.5	W.	1
	" "	3 P. M.	29.900	80	79	Stratus,	E.	9.5	N. E.	1.5
	" "	6 "	29.885	80	79.4	Cumulus stratus,	N. E.	9.5	N. W.	1
	" "	9 "	29.933	79	78	Cumulus,	"	9.5	"	1
	" 2	6 A. M.	29.915	77	76.5	"	N. E.	5	"	.5
	" "	9 "	29.954	83.5	81.6	Cumulus stratus,	"	6	N. W.	1
	" "	12 M.	29.947	83.5	81.6	" "	N.	6	"	1.5
	" "	3 P. M.	29.900	80.5	79.7	Stratus,	"	9.5	"	1
	" "	12 M.	29.958	77	77	Cirro stratus,	"	9.5	N. W.	2
	" 3	6 A. M.	29.940	78	77.4	Cumulus stratus,	N. W.	9	"	1
	" "	12 M.	29.987	84.5	83.2	Cirro cumulus,	N. E.	4.5	N. E.	2
	" "	3 P. M.	29.964	79.8	79.2	Cumulus stratus,	"	9	W.N.W.	3
	" "	6 "	29.933	78.8	78	" "	"	9	"	3
	" "	9 "	29.946	77.5	76.8	" "	"	9	N. W.	3
	" 4	6 A. M.	29.935	76.5	76.1	Cirro stratus,	"	"	N. E.	1
	" "	9 "	30.020	77.8	77	Stratus,	"	"	"	1
	" "	12 M.	30.021	78.8	78.1	Cumulus stratus,	"	8	"	"
	" "	3 P. M.	29.944	80.7	79.7	" "	"	9	W.	1
	" "	6 "	29.941	79	78.6	Cirro cum. strat.,	N.	7	S. W.	1
	" "	9 "	29.996	77	77	Cirrus,	W	3	N. W.	2
	" 5	6 A. M.	29.997	76.5	76.1	Cumulus stratus,	N.	7	"	"
	" "	9 "	30.039	79.5	78.5	Cirro,	"	8	"	"
	" "	12 M.	30.029	83.8	82.2	Cumulus stratus,	S.	7	N. W.	2
	" "	3 P. M.	29.995	82	80.8	Cirro cumulus,	S.	9	W.N.W.	2
	" "	6 "	30.005	80	79.5	Stratus,	"	10	0	0
	" "	9 "	30.027	78	77.4	Cumulus stratus,	"	9	0	0
	" 6	6 A. M.	29.975	74.8	74.5	Cirro stratus,	"	8	N. W.	1
	" "	9 "	30.022	79.3	78.3	Cirro cumulus,	N. W.	8	"	1
	" "	12 M.	30.032	81.5	80.2	" "	N.	8	W.	2
	" "	3 P. M.	29.970	79.3	78.4	Cumulus stratus,	"	10	N. W.	3
	" "	6 "	29.960	78.5	77.5	Cumulus,	"	10	N.N.W.	1
	" "	9 "	29.994	77.5	76.5	Cumulo stratus,	"	9	W.	3
	" 7	6 A. M.	29.949	75	74.8	Cumulus,	W.	2	N. W.	2
	" "	9 "	29.987	80.5	79	"	N.	"	W.	3
	" "	12 M.	29.971	83.5	82	"	"	4	N.	2
	" "	3 P. M.	29.923	79.8	79	"	"	8	N. W.	2
	" "	6 "	29.924	78	77.5	Cirro cumulus,	"	6	"	2
	" "	9 "	29.944	77	76.6	Cirrus,	"	2	"	1
	" 8	9 A. M.	29.980	81.5	82.2	Cumulus,	E.	1	"	.5
	" "	12 M.	29.984	83.5	82.2	"	N.	4	W.	3
	" "	3 P. M.	29.921	80.5	79.3	"	E.	7	N. W.	2
	" "	6 "	29.948	80.5	79.5	"	N.	7	N.N.W.	4
	" "	9 "	29.980	77.8	77	Cirro cumulus,	"	8	N. W.	.5
	" 9	6 A. M.	29.965	75	74.8	Cumulus,	"	1	"	1
	" "	9 "	30.015	81.5	79.8	"	N.	.5	0	0
	" "	12 M.	30.007	83	81.8	"	"	3	N. W.	3

made at Panama.

Hour.	Thermometers.			Dan. Hygrometer.			Dew-point = Free Therm. — prec. Diff.	Wet Bulb.		Remarks.
	Max.	Min.	Rad.	Before be- ing wet with ether.	After be- ing wet with ether.	Difference = Fall of Therm.		Free.	Wet.	
9 P. M.	°	°						77.5	74°	
6 A. M.				76	74	2	72.9	74.9	72	
9 "	84	74		85	75.5	9.5	71	80.5	75	
12 M.				82	75	7	72.5	79.5	75	Slight shower.
3 P. M.				83	76	7	72.4	79.4	75	
6 "				80	75.5	4.5	75.1	79.6	75	
9 "								77	74	
6 A. M.				77.5	75.5	2	74	76	73.8	
9 "	85	74		82.5	76	6.5	73.3	79.8	75.5	
12 M.				85.5	77	8.5	73	81.5	76.5	
3 P. M.				81	76	5	74	79	75.8	
6 "				81.5	76	5.5	73.9	79.4	75	
9 "								78	73.5	
6 A. M.				77	75.5	1.5	7.5	76.5	74	
9 "	85	75						81.7	77.5	
12 M.				86	77.5	8.5	73.3	81.8	77.4	
3 P. M.				83	75.5	7.5	72.3	79.8	75	
12 M.				78.5	78	.5	76.5	77	75.3	
6 A. M.				78.5	76	2.5	74.9	77.4	74.2	
12 M.			121	84.5	73.5	11	72.2	83.2	79.8	2 P. M. hard shower, thunder and [lightning in N.]
3 P. M.				80.8	75	5.8	73.4	79.2	77.5	
6 "				80	75.5	4.5	73.5	78	77	
9 "				79	74	5	71.8	76.8	75.5	} Showery.
6 A. M.				78.8	75	3.8	72.3	76.1	75	
9 "	86	75.5		78	75	3	74	77	75.3	Hard rain.
12 M.				80.5	75.5	5	73.1	78.1	77.3	No rain.
3 P. M.				82	77	5	74.7	79.7	76.6	
6 "				81.5	75	6.5	73.1	78.6	77	
9 "				79.5	77	2.5	74.5	77	75.8	Lightning N. W.
6 A. M.				78	73.5	4.5	71.6	76.1	75.4	
9 "	81	75		80	74	6	72.3	78.3	76.5	
12 M.			101.8	82.5	78	4.5	77.7	82.2	79.2	
3 P. M.				83	76.5	6.5	74.3	80.8	77.5	
6 "				81.5	74	7.5	72	79.5	77.6	Drizzly rain.
9 "				79.5	75	4.5	72.9	77.4	76.4	7 P. M. very hard rain. All over [at 8 P. M.]
6 A. M.				76.5	72	4.5	70	74.5	73.5	
9 "	84.5	73.5	87.9	80.5	75.5	5	73.3	78.3	76.2	
12 M.			95.3	81.5	76	5.5	74.7	80.2	78.2	
3 P. M.				80.5	75	5.5	72.9	78.4	77	2½ P. M. drizzly rain.
6 "				79	75	4	73.5	77.5	76.5	5 P. M. "
9 "				78	74.5	3.5	73	76.5	75.3	
6 A. M.			82	75.5	73.5	2	72.8	74.8	74	Clouds near horizon.
9 "	82.5	73.5	92.5	80	76.7	3.3	75.7	79	76.7	
12 M.								82	78.5	2 P. M. hard rain.
3 P. M.								79	77.2	
6 "								77.5	75.1	
9 "								76.6	75.5	
9 A. M.	84	73	105.4					80.2	76.6	
12 M.			107.5					82.2	77.5	2 P. M. drizzly rain, 2½ P. M. [hard rain, 3 P. M. no rain.]
3 P. M.								79.3	77	
6 "								75.5	77	
9 "								77	75	
6 A. M.								74.8	73	Clouds near horizon.
9 "	85	74	103.5					79.8	74.4	" "
12 M.			110.4					81.8	72.8	

Longitude of Chagres, New Grenada.

Longitude of Chagres (house of Don Luis Paredes) West from New York, as obtained by the Transportation of Chronometers in the Steamship Northerner, leaving New York March 1st, and arriving at Chagres March 13th, 1849.

Observer at Chagres, Major W. H. Emory.

No. of Chronometer.	Rate as determined at the Observatory, Cambridge, Mass.	Rate as determined at New York City.	Rate as determined at Panama, N. G.	Mean Rate.	Difference of Longitude between New York and Chagres by each Chronometer.
		s.	s.	s.	m. s.
Charles Young, 76,		—2.7	—1.4	—2.05	24 22.29
Egbert & Son, 152,		—3.5		—3.50	24 07.40
Parkinson & Frodsham, 420,	+7.2	+7.4	+0.5	+5.05	23 58.38
Barraud, 738,	—0.6	—1.37	—1.6	—1.19	24 03.08
Parkinson & Frodsham, 719,	+4.2	+4.4	+4.52	+4.37	23 55.95

Longitude of Chagres West of New York $24^m\ 05^s.41$

“ Columbia College West of Greenwich $4^h\ 56^m\ 00^s$ taken from the *Conn. des Temps* of 1849.

“ Chagres “ “ $5^h\ 20^m\ 05^s.41 = 80^\circ\ 01'\ 21''.15$

Latitude of Chagres as determined by Espinar (Boco del Foro), $9^\circ\ 20'$